

Amendments to the Claims

Σ, 1. (Currently amended) A physical vapor deposition target comprising a material with a face centered cubic unit cell, having a sputtering surface, and formed by a process comprising:

casting;

equal channel angular extrusion; and

after the equal channel angular extrusion, modifying crystallographic texture orientation by additional processing comprising at least one of cross-rolling and forging to enhance one of axial-oriented <220> and planar-oriented <220> crystallographic texture; the target having a (220) plane intensity contribution of at least about 60% relative to a total intensity contributed by (220), (200), (111) and (113) planes, a predominate <220> crystallographic texture across the sputtering surface, and an average grain size across the sputtering surface of less than or equal to about 30 microns.

2. (Original) The physical vapor deposition target of claim 1 wherein the average grain size across the sputtering surface is less than or equal to 1 micron.

3. (Original) The physical vapor deposition target of claim 1 further comprising substantially no pores or voids proximate the sputtering surface.

4. (Original) The physical vapor deposition target of claim 1 wherein the predominate <220> crystallographic texture is a strong <220> crystallographic texture.

5. (Original) The physical vapor deposition target of claim 1 comprising a ratio of the <220> crystallographic orientation to all other orientations of the face centered cubic unit cell of at least about 80%.

6. (Original) The physical vapor deposition target of claim 1 comprising a ratio of the <220> crystallographic orientation to all other orientations of the face centered cubic unit cell of at least about 90%.

7. (Original) The physical vapor deposition target of claim 1 wherein substantially all of the grain sizes across the sputtering surface are less than about 30 microns.

8. (Original) The physical vapor deposition target of claim 1 wherein substantially all of the grain sizes across the sputtering surface are less than 1 micron.

9. (Previously presented) The physical vapor deposition target of claim 1 wherein the additional processing comprises forging and the <220> texture comprises predominately axial <220> orientations.

10. (Previously presented) The physical vapor deposition target of claim 1 wherein the additional processing comprises cross-rolling and the <220> texture comprises predominately planar <220> orientations.

Ε,

11. (Previously presented) The physical vapor deposition target of claim 1 comprising at least one element selected from the group consisting of aluminum, copper, silver, gold, nickel, brass, cerium, cobalt, calcium, iron, lead, palladium, platinum, rhodium, strontium, ytterbium, and thorium.

12. (Previously presented) The physical vapor deposition target of claim 1 comprising at least one element selected from the group consisting of aluminum, copper, gold, nickel, and platinum.

13. (Original) The physical vapor deposition target of claim 1 wherein any precipitates present in the target have a maximum dimension of 0.5 micron.

Claims 14-66. (Cancelled).

Σ₁

67. (Currently amended) A physical vapor deposition target comprising:
~~comprising~~

a copper material with a face centered cubic unit cell; ~~cell, having a sputtering surface, and comprising:~~

a (220) plane intensity of at least 60% based upon a total intensity of (220), (200), (111) and (113) planes;

a predominate <220> crystallographic texture across ~~the~~ a sputtering surface; and
an average grain size across the sputtering surface of less than or equal to about 30 microns, wherein any second-phase precipitates present in the target have a maximum dimension of 0.5 micron.

~~micron, the material being formed by a process comprising:~~

~~equal channel angular extrusion to produce a microstructure; and~~

~~aging to induce the second phase precipitates for enhancing stability of the microstructure produced by the equal channel angular extrusion.~~

68. (Previously presented) The physical vapor deposition target of claim 67 comprising at least one element selected from the group consisting of aluminum, silver, and gold.

69. (Previously presented) The physical vapor deposition target of claim 68 comprising aluminum.

Σ₁

70. (Previously presented) The physical vapor deposition target of claim 68 comprising silver.

71. (Previously presented) The physical vapor deposition target of claim 68 comprising gold.

72. (Previously presented) The physical vapor deposition target of claim 67 wherein the average grain size across the sputtering surface is less than or equal to 1 micron.

73. (Previously presented) The physical vapor deposition target of claim 67 further comprising substantially no pores or voids proximate the sputtering surface.

74. (Previously presented) The physical vapor deposition target of claim 67 wherein the predominate <220> crystallographic texture is a strong <220> crystallographic texture.

75. (Previously presented) The physical vapor deposition target of claim 67 comprising a ratio of the <220> crystallographic orientation to all other orientations of the face centered cubic unit cell of at least about 80%.

21

76. (Previously presented) The physical vapor deposition target of claim 67 comprising a ratio of the <220> crystallographic orientation to all other orientations of the face centered cubic unit cell of at least about 90%.

77. (Previously presented) The physical vapor deposition target of claim 67 wherein substantially all of the grain sizes across the sputtering surface are less than about 30 microns.

78. (Previously presented) The physical vapor deposition target of claim 67 wherein substantially all of the grain sizes across the sputtering surface are less than 1 micron.

79. (Previously presented) The physical vapor deposition target of claim 67 wherein the <220> texture comprises predominately axial <220> orientations.

80. (Previously presented) The physical vapor deposition target of claim 67 wherein the <220> texture comprises predominately planar <220> orientations.

Claims 81-83 (Cancelled).

£1

84. (New) A physical vapor deposition target comprising a material with a face centered cubic unit cell, the target comprising:

a (220) plane intensity of at least about 60% based upon a total intensity of (220), (200), (111) and (113) planes; and

at least one element selected from the group consisting of aluminum, copper, silver, gold, nickel, brass, cerium, cobalt, calcium, iron, lead, palladium, platinum, rhodium, strontium, ytterbium, and thorium.

ϵ ,
